R E P O R T R E S U M E S

ED 020 023 PS 000 977

SOCIOECONOMIC STATUS AND LEARNING PROFICIENCY IN YOUNG CHILDREN.

BY- ROHWER, WILLIAM D., JR. AND OTHERS
CALIFORNIA UNIV., BERKELEY

EDRS PRICE MF-$0.25 HC-$0.60 13P.

DESCRIPTORS- *PAIRED ASSOCIATE LEARNING, *LANGUAGE ABILITY, COGNITIVE ABILITY, LEARNING PROCESSES, LEARNING THEORIES, LOW INCOME GROUPS, *LEARNING CHARACTERISTICS, *COMPARATIVE TESTING, *SOCIOECONOMIC INFLUENCES, KINDERGARTEN CHILDREN, KINDERGARTEN, GRADE 1, PRIMARY GRADES, GRADE 3,

THIS STUDY WAS INITIATED TO DETERMINE WHY CHILDREN OF LOWER SOCIOECONOMIC STATUS, WHO DO INFERIOR WORK ON SCHOOL-RELATED LEARNING TASKS WHEN COMPARED TO UPPER SOCIOECONOMIC STATUS CHILDREN, LEARN AS EFFICIENTLY AS UPPER LEVEL CHILDREN ON PAIRED-ASSOCIATE TASKS. THE SAMPLE CONSISTED OF 120 LOWER STATUS CHILDREN AND 120 UPPER STATUS CHILDREN, EQUALLY DISTRIBUTED AMONG THE KINDERGARTEN, FIRST GRADE AND THIRD GRADE, WHO WERE ADMINISTERED PAIRED-ASSOCIATE TASKS. FOUR METHODS OF PRESENTATION OF THE 20 PAIRED ASSOCIATES WERE USED--(1) PROVIDED-PHRASE (PP), (2) PROVIDED-SENTENCE (PS), (3) GENERATED-STILL (GS), AND (4) GENERATED-ACTION (GA). THE PRIMARY DIFFERENCE BETWEEN THE PP-PS METHODS AND THE GA-GS METHODS WAS THAT IN THE LATTER, THE CHILDREN HAD TO CONSTRUCT THEIR OWN SENTENCES, USING THE PAIR NAMES. IN THE PP AND PS METHODS, THE CHILDREN JUST REPEATED A PHRASE (PP) OR SENTENCE (PS) GIVEN BY THE EXPERIMENTER. A PROJECTOR AND SCREEN APPARATUS WERE USED TO PRESENT THE PAIRED OBJECTS. THE PICTURES USED IN THE PP, PS, AND GS METHODS WERE STILL PICTURES. THE GA METHOD USED ACTION PICTURES IN WHICH THE DISPLAYED OBJECTS WERE PART OF AN ACTION CONTEXT. TWO TEST TRIALS WERE SUBSEQUENTLY CONDUCTED. THE TEST TRIALS INVOLVED DISPLAYING ONE OF THE PAIR ON THE SCREEN AND REQUIRING THE PUPIL TO NAME THE OTHER ITEM OF THE PAIR. THE RESULTS OF THE TEST TRIALS INDICATED THAT THE LOWER LEVEL CHILDREN DID NOT HAVE THE LANGUAGE DEFICIENCY ANTICIPATED ALTHOUGH THEY LEARNED LESS EFFICIENTLY THAN THE UPPER STATUS CHILDREN AT THE KINDERGARTEN AND FIRST GRADE LEVEL. A POSSIBLE REASON FOR THIS LOWER PERFORMANCE BY THE LOWER STATUS CHILDREN IS THAT UPPER STATUS CHILDREN BENEFITED MORE FROM LARGER NUMBERS OF PAIRING-TRIAL REPETITIONS. (WD)

U. S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Socioeconomic Status and Learning Proficiency in Young Children

William D. Rohwer, Jr., Nancy Suzuki, and Linnea Ehri

University of California, Berkeley

ED020023

Why do lower-strata children, whose performance on school-related learning tasks is inferior, learn as efficiently as upper-strata children on PA tasks? In an attempt to answer this question, the hypothesis that initiated the present experiment was that the less the degree of environmental support for the use of elaboration on the learning task, the greater the likelihood that lower-strata children would perform less well than upper-strata children. A more specific form of this hypothesis contended that lower-strata children would benefit as much as upper-strata children from provided elaboration but that they would be deficient in generating elaborative structures that would successfully facilitate learning when these were requested by instructions but not provided by the experimenter.

Method

Subjects. Samples of 40 Ss each were drawn randomly from kindergarten, first- and third-grade classes in a lower- and in an upper-strata elementary school. Thus the total sample numbered 240 children. Ten Ss from each sub-sample were randomly assigned to each of the four experimental conditions such that an independent group of Ss from each sample served under each of the conditions.

PS 000627

Materials and design. All Ss were asked to learn a list of 20 film PAs by a pairing-test method. The four experimental conditions were distinguished principally in terms of the procedure followed on the first pairing trial. In the first condition, provided-phrase (PP), as each pair appeared on the screen,

E uttered aloud the names of the two objects and the S repeated those names. Then the projector was stopped and E read aloud a conjunction phrase containing the names of the two objects that had been in view immediately before (e.g., The DOG and the little GATE) and this phrase was immediately repeated by S. The same procedure was followed for every one of the 20 items in the list. A similar procedure was followed in the second condition, provided-sentence (PS) except that rather than reading a phrase containing the names of the two objects in each pair, the E read a sentence in which these two nouns were connected by a verb (e.g., The DOG closes the little GATE). In the third condition, generated-still (GS) when the projector was stopped after the first exposure of the pair, the S was asked to construct and utter a sentence about the two objects shown. The remainder of the procedure was the same as that followed in PP and PS. In all of the three conditions described thus far, the still or stationary version of the PA film materials was used. However, in the four condition, generated-action (GA) the action version of the materials was used. The procedure followed was identical to that for GS, the only difference between the two conditions being that of action vs. still pictures.

The procedure followed during the first pairing trial thus varied across experimental conditions. During the second pairing trial, however, the procedure was identical for all conditions, that is, as each pair appeared on the screen, the E uttered aloud the names of the two objects then in view while the S simply watched the screen and listened. Nevertheless, one difference did exist, even on the second pairing trial between GA and the other three conditions, namely, that action pictures were used in the case of the former while still pictures were used in all of the latter. The two test trials were completely identical for all four conditions: one item from each pair was presented on the screen and as each

of these appeared, E uttered its name while S attempted to respond with the name of the other member of the pair. During the test trials, the items were presented at a 4-sec. rate in all conditions. The rate of presentation varied during the initial pairing trial, depending upon the experimental condition and, to permit an assessment of this variable, the amount of time expended during that trial was measured by means of a stopwatch and recorded for each S. In the two generation conditions, GS and GA, the sentences produced by the Ss were recorded verbatim by one of the two Es present in the testing room. A total of two pairing and two test trials were administered to all Ss.

Some discussion of the particular experimental conditions chosen for inclusion in the present experiment is in order. Recall first that the entire design is a three-way factorial in which the principal independent variables are Grades (K, 1, 3), Strata (upper vs. lower) and Conditions (PP, PS, GS, GA). Upper- and lower-strata children had been found previously to perform at equivalent levels under conditions of learning comparable to the present PP and PS conditions. Furthermore, a condition like PS had proven to be facilitory relative to PP for both kinds of populations. As for the two conditions in which Ss themselves were required to generate sentence elaborations for the PA task, one provided considerable stimulus support for this activity (GA) whereas the other did not (GS). In GA the S's task was simply to construct a sentence describing an activity already represented to him visually. In GS, however, the activity was not made available.

The expectation following from the initiating hypothesis was that upper- and lower-strata Ss would perform at equivalent levels in PP, PS and GA but that upper-strata Ss would excel in GS, especially those in the kindergarten and first grade samples. Thus the experiment was intended to evaluate the notion that lower-strata children are deficient in the activity of self-initiated elaboration.

Results

Learning. Learning efficiency was indexed in terms of the numbers of correct responses made on the two test trials. The results are presented in Table 1 as a function of Grades, Strata and Conditions. Analysis of variance revealed significant main effects associated with each of the principal variables: Grades, F (2,216) = 8.08, $p < .01$; Strata, F (1,216) = 17.47, $p < .01$; and Conditions, F (3,216) = 13.92, $p < .01$. Within the main effect for Grades, post hoc comparisons revealed no significant difference between the kindergarten and first-grade samples, both of which performed significantly less well than the third-grade sample. The latter outcome did little violence to what had been expected. In contrast, the main effect of Strata, in which the upper-strata sample performed better than the lower-strata sample was surprising and inconsistent with what had been observed previously. The strata difference poses the main interpretive task resulting from the present experiment.

Among the four experimental conditions, a variety of comparisons were made by the Tukey method: GA was superior to each of the other three conditions; GS was superior to the control condition, PP; PS was superior to PP; GS and PS did not differ significantly; and, the two generation sentence conditions were superior to the presented sentence conditions.

The latter result, as well as that showing no difference between GS and PS must, in one sense, be taken as an underestimate of the facilitory effect of self-generated elaboration. This statement follows from a careful examination of the procedures followed in the two kinds of conditions. Specifically, during the initial pairing trial in the Presented conditions, the names of the two objects in each pair were uttered aloud a total of four times, twice by E and twice by S. In contrast, the names of the pair members were uttered aloud only three times

in the Generated conditions, once by E, and twice by S (the latter is a maximum figure since Ss did not always include both names in the sentences they generated). As will be pointed out in the following section, however, this conclusion is not entirely supportable, since more time was consumed during the initial pairing trial by Ss in the Generated than by Ss in the Presented conditions. If the additional time was used to practice the pairs to be learned, then the present results overestimate rather than underestimate the superiority of self-generated elaboration. A more complete discussion of this problem will be provided shortly.

Neither the predicted interaction of Strata with Conditions, nor that of Grades, Strata and Conditions was significant, $F < 1$, in both cases. The two-way interaction of Grades and Strata, however, was significant, $F(2,216) = 3.04$, $p < .05$, such that the upper-strata samples were superior only in the Kindergarten and Grade 1 cases.

The only remaining significant effect of interest is the two-way interaction of Strata with Trials, $F(1,216) = 5.89$, $p < .05$. The form of this interaction, shown in Table 2, indicates that the superiority of upper-strata children is greater on trial 2 than on trial 1. Similar effects have been detected previously, suggesting that lower-strata children may, in fact, benefit less than upper-strata children from simple repetition. As will become clear in the discussion of the present experiment, this suggestion will comprise the major interpretation provided for the observed inferiority of performance on the part of the lower-strata children.

Time. As previously noted, the amount of time consumed by each S in completing the initial pairing trial was recorded by E. Even though the relationship between pairing-trial time and performance on the learning task proper was negligible, $r(239) = -.006$, the following analysis was conducted since time is of interest in its own right. Time in minutes, as a dependent variable, was

subjected to analysis of variance in which the principal factors were: Grades, Strata and Conditions. A summary of the analysis of variance is presented in Table 3 and the results relevant to those tests are presented in Table 4.

With the exception of the main effect of strata, all of the tests performed in the analysis of variance were significant. Accordingly, assertions about any of the less complex effects must be tempered by what is revealed in the more complex interactions. A careful examination of the results with appropriate attention given to the qualifications required by the significant three-way interaction term, yields the following conclusions. The observed differences between Grades in the amount of time consumed during the initial pairing trial are located entirely within condition GS; in the lower-strata samples, Kindergarten Ss required more time than first- or third-graders, while in the upper-strata samples, both the Kindergarten and the first-grade samples required more time than the third grade sample. The main effect of conditions is located principally in the larger amount of time consumed in the GS condition than in the other three but, it must be noted, that this effect only holds for the lower-strata kindergarten, upper-strata kindergarten and upper-strata first-grade samples. Finally, the strata difference intimated by the significant two-way interactions of Strata x Grades and Strata x Conditions is attributable entirely to the larger amount of time taken in condition GS by the upper-strata first graders as compared with the lower-strata first graders.

Of all these significant effects, two are worth additional comment. The first concerns the larger amount of time required by the younger Ss in the GS condition. As expected, the task posed for the young child when he is required to generate a sentence about two objects depicted in a stationary manner is a difficult one. Apparently, additional training and/or maturation beyond that characteristic of kindergarten-age children is required before the task can be accomplished with facility. Secondly, it should be mentioned that in terms of

the time measure, lower-strata first-grade children appear to have more facility in constructing sentences in the GS condition than do the upper-strata children. This result contradicts expectations about the differential language facility of lower- and upper-strata children and, therefore requires the closer examination provided by an analysis of the sentences produced by the children assigned to the two generation conditions.

Generated Sentences. The sentences produced by Ss in the GS and GA conditions can be scored in a large variety of ways. Three of the possible scores were chosen for analysis; the criterion for this choice was that the scores should index sentence properties of known or presumed relevance for PA learning. The three scores were: (a) the number of nouns from the PAs actually used in the sentences; (b) the number of sentences in which the form class of the connective linking the two nouns was verb; and, (c) the number of different verbs used in the sentences generated by each S.

Each of these dependent variables was subjected to analysis of variance in which the sources assessed were: Grades, Strata and Conditions. The results for variable (a), number of nouns used, are presented in Table 5 as a function of the three independent variables. Only one significant source of variance emerged, namely, Grades, F (1,108) = 22.46, $p < .01$. Fewer nouns were included in sentences by the Kindergarten Ss than by either the first- or the third-graders. The latter two did not differ. The main effect of Strata was not significant, $F < 1$, nor were any of its interactions.

The results obtained in connection with variable (b), number of verb connectives, are shown in Table 6. Once again, Strata failed to account for a single significant source of variance. The main effect of conditions, however, was significant, F (1,108) = 18.97, $p < .01$; more verb connectives were used in the Action than in the Still condition. None of the other terms in the analysis of variance, including that of Grades, was significant.

Similarly, the only significant source of variance in variable (c), the number of different verbs used by each S, was Conditions, F (1,108) = 6.72, $p < .05$. As an inspection of the results presented in Table 7 indicates, a greater variety of verbs was used in the Action than in the Still condition. The main effect of Strata was negligible, $F < 1$, and none of its interactions are significant.

Discussion

Clearly, the present results contain no evidence to support the usual contention that lower-strata children are deficient in task-related language skills. Thus the problem remains to account for the fact that in contrast to previous experiments the upper-strata kindergarten and first-grade samples in the present study learned more efficiently than comparable lower-strata samples.

One interpretation is that the populations sampled in the three experiments were different. This possibility cannot be entirely discounted but the visible characteristics of the various populations were quite comparable. A more appealing interpretation is that the difference in results should be attributed to the procedural difference emphasized earlier, that is, to the larger number of pairing-trial repetitions of each PA item that occurred in the present experiment. As noted, the lower-strata samples benefit less from inter-trial repetition than do the upper-strata samples. If this effect can be generalized in intra-trial repetitions, it accounts for the observed discrepancy among the various experiments. In this connection, it is interesting that the results of the present experiment are entirely consistent with those reported by Semler and Iscoe (1963). It will be recalled that in the latter investigation a multi-trial procedure was followed, which, according to the repetition hypothesis, would have permitted the emergence of a strata difference in the five- and six-year old samples.

The conclusions we have derived from our studies of the relationship between elaboration and learning proficiency are the following.

i. Under optimal conditions of learning, lower-strata or culturally disadvantaged children, six years of age and older, are not inferior to upper-strata children either in basic PA learning proficiency or in ability to benefit from elaborative forms of presenting learning materials.

ii. Inferior performance among lower-strata, five and six year old children does emerge when the task involves multiple repetitions of the learning materials.

iii. No evidence was found to support the contention that the latter effect is due to strata differences in the ability to produce sentence elaboration.

iv. In the pre-school age range (three to five years of age) inferior performance among lower-strata children is observed even under optimal conditions of learning.

v. The PPVT predicts learning proficiency moderately well among upper-strata children but is unrelated to learning proficiency in lower-strata children.

vi. The film material PA task used in the present project promises to be of considerable utility, when appropriately modified, as a test for identifying and classifying learning deficiencies in young children and for distinguishing between cultural and familial retardates.

Relevant References

Rohwer, W. D., Jr. Constraint, syntax and meaning in paired-associate learning. J. verb. Learn. verb. Behav., 1966, 5, 541-547.

Rohwer, W. D., Jr., Lynch, S., Levin, J. R., and Suzuki, Nancy. Pictorial and verbal factors in the efficient learning of paired associates. J. educ. Psychol., 1967, 58, 278-284.

Rohwer, W. D., Jr., Lynch, S., Levin, J., and Suzuki, Nancy. Grade level, school strata and learning efficiency. J. educ. Psychol., in press.

Rohwer, W. D., Jr., Lynch, S., Suzuki, Nancy, and Levin, J. Verbal and pictorial facilitation of paired-associate learning. J. exp. child Psychol., 1967, 5, 294-302.

Rohwer, W. D., Jr. Social class differences in the role of linguistic structures in paired associate learning. Final report of U. S. Office of Education project number 5-0605, contract number OE-6-10-273, 1967.

Rohwer, W. D., Jr., and Lynch, S. Retardation, school strata and learning proficiency. Amer. J. ment. Defic., in press.

Semler, I. J. and Iscoe, I. Comparative and developmental study of the learning abilities of Negro and white children under four conditions. J. educ. Psychol. 1963, 54, 38-44.

Table 1
Mean Numbers of Correct Responses as a Function of Grades, Strata and Conditions

	Grades						
	K		1		3		
Conditions	Upper	Lower	Upper	Lower	Upper	Lower	Total
PP	11.80	10.40	12.30	8.95	11.90	11.80	11.19
PS	13.70	11.45	13.85	10.80	14.20	12.20	12.70
GS	13.05	10.95	13.75	12.10	14.55	16.15	13.42
GA	14.90	12.95	14.70	13.10	15.90	15.25	14.47
Total	13.36	11.44	13.65	11.24	14.14	13.85	

Table 2
Mean Numbers of Correct Responses as a Function of Strata and Trials

Strata	1	2	Total
Upper	11.23	16.20	13.72
Lower	10.04	14.31	12.17
Total	10.64	15.25	

Table 3
Summary of Analysis of Variance Performed on
Pairing-Trial Time

Source	df	Mean Square	F
Strata (S)	1	1.46	< 1
Grades (G)	2	16.12	29.50**
Conditions (C)	3	39.98	73.17**
S x G	2	4.61	8.43**
S x C	3	4.65	8.50**
G x C	6	1.92	3.51**
S x G x C	6	2.43	4.45**
Subjects/SGC	216	.55	

** $p < .01$

Table 4
Mean Amounts of Pairing-Trial Time (in mins.) as a
Function of Grades, Strata and Conditions

	Grades								
	K		1		3		Total		
	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Total
PP	3.70	3.98	3.56	3.60	3.30	3.35	3.52	3.64	3.58
PS	4.12	4.19	3.80	3.83	3.44	3.57	3.79	3.86	3.83
GS	6.10	5.92	7.16	4.43	4.41	4.35	5.89	4.90	5.39
GA	4.18	4.53	4.05	3.86	3.45	3.79	3.89	4.06	3.98
Total	4.53	4.65	4.64	3.93	3.65	3.76	4.27	4.12	

Table 5
Mean Numbers of Nouns Used in Generated Sentences as a Function of Strata, Grades and Condition

	Strata				
	Upper		Lower		
Grades	GS	GA	GS	GA	Total
K	23.90	32.50	30.80	31.80	29.75
1	36.20	38.20	35.30	35.40	36.28
3	38.40	39.30	39.20	38.70	38.90
Total	32.83	36.67	35.10	35.30	

Table 6
Mean Numbers of Verb Connectives Used in Generated Sentences as a Function of Strata, Grades and Conditions

	Strata				
	Upper		Lower		
Grades	GS	GA	GS	GA	Total
K	9.30	15.10	12.70	15.90	13.25
1	13.30	18.10	14.10	16.30	15.45
3	14.40	19.00	11.80	16.60	15.45
Total	12.33	17.40	12.86	16.20	

Table 7
Mean Numbers of Different Verbs Used in Generated Sentences as a Function of Strata, Grades and Conditions

	Strata				
	Upper		Lower		
Grades	GS	GA	GS	GA	Total
K	14.60	16.40	13.80	17.20	15.50
1	15.90	16.30	15.80	17.20	16.30
3	15.50	16.80	17.20	16.20	16.42
Total	15.33	16.50	15.60	16.87	

PS
JGW CZRIC